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Corrections for the Effects of Atmospheric Conditions on Photometric Flame Standards.[1]

[A Paper Read at the Meeting of the International Photometric Commission, Zürich, July, 1911, by the Authors, W. J. A. Butterfield, F.I.C., J. S. Haldane, M.D., F.R.S., and A. P. Trotter, M.Inst.C.E.]

The effects of variation of the pressure, degree of humidity and vitiation (deficiency of oxygen and excess of carbon dioxide) of the atmosphere on the luminous intensity of flames cannot be determined from the variations naturally occurring in an ordinary photometric testing room, except perhaps by deduction from the data obtained in a very prolonged series of observations made with exceptional care concurrently with extremely accurate determinations of the composition of the air. But in ordinary circumstances large variations, especially of one condition independently of the others, are necessarily rare, and the majority of the observations thus made will be of little or no utility in the investigation. Hence the ultimate conclusions even in this case will rest chiefly on a comparatively small proportion of the observations, and, therefore, unless the work has been extended over a very long period, on only a small number of them. The investigation may be carried out in a much shorter space of time and with greater trustworthiness if the observations are made in a room or chamber provided with means by which one set of conditions may be varied at will to any desired degree almost or wholly independently of the other two sets of conditions. The authors have made the investigations of which the results are reported in this communication in such a room or chamber.

The Steel Compression Chamber and Its Equipment.—The effects of variations in the atmospheric pressure on the light afforded by the Harcourt 10-candle pentane lamp, and by the Hefner amyl-acetate lamp, were first studied. For this portion of the work, and for some of the later investigations also, use was made of a steel compression chamber, designed primarily for physiological research on "caisson" disease or diver's palsy and mountain sickness. This chamber, which had been presented to the Lister Institute of Preventive Medicine by Dr. Ludwig Mond, F.R.S., was kindly placed at the disposal of the authors by Dr. Martin, the Director of that Institute. It is a short boiler of ⅝ inch (16 mm.) plate resting on its side; the ends are slightly dished steel plates ½-inch (13 mm.) thick. Inside it measures 7½ feet (2.29 metres) in length by 7 feet in diameter (2.13 metres) and has a capacity of 336 cubic feet (9,500 litres). In one end is an elliptical manhole 24 by 15 inches (609 by 381 mm.), the cover of which is secured by large bolts and can be readily fixed or removed from outside the chamber. In addition to four spring valves, the chamber is provided with three simple valves by means of which the pressure can be completely controlled either from inside or outside. The pressure is raised or reduced by a simple compressor driven by a gas engine, and it can be raised when required at the rate of about 2 pounds per square inch (about 0.133 kilo. per sq. cm.) per minute. The circulation of air maintained by the pump was sufficiently rapid to prevent serious vitiation of the air of the chamber when two observers were present in it. The Harcourt lamp, when used, was placed below a hood directly connected with the outlet air-way from the chamber, so that the greater part of the products of combustion of the pentane did not mix with the air in the chamber before they were extracted from it. The efficiency of the ventilation of the chamber was checked by a determination of the proportion of carbon dioxide in a sample of the air taken while each set of photometric observations was in progress. These determinations were made by means of the portable apparatus for the determination of carbon dioxide in air devised by J. S. Haldane (*vide* "Journal of Hygiene," 1901, I. 109). In the subsequent investigation of the effects of atmospheric vitiation on the light afforded by the Harcourt and Hefner lamps, the proportion of oxygen in the air was determined by means of the portable form of gas analysis apparatus devised by J. S. Haldane ("Journal of Hygiene," 1906, VI., 74). When necessary an electric fan was used in the chamber to keep the air well mixed.

The chamber was provided with electric light and electric heaters, and a telephone communicating with outside. There were small, stout glass windows in the ends. Two benches were arranged in the chamber. On one of them the photometer, with an electric standard lamp and the flame standard, were set up, while the other was used for the air analysis apparatus and accessories. The degree of humidity of the air was ascertained by means of an Assmann hygrometer (*vide* Zeits. für Instrumentenkunde, 1892, XII., 1) which consists broadly of wet and dry bulb thermometers, over which a regulated current of air is drawn by means of a clockwork fan. A simple **U** mercury manometer, one limb of which communicated with

1. For our copy we are indebted to the attention of the authors.

outside, was used for measuring pressures above normal, and the pressures below normal were read on a standard mercury barometer inside the chamber.

Description of the Electrical Apparatus Used.—A small electric lamp was used as a standard. It was mounted on a carriage guided by V notches. A rod attached to the carriage, as in the Gas Referees' photometer, was used to adjust the position of the lamp. A scale was carried on the rod, and an index was fixed to the photoped.

For setting the filament of the electric lamp as exactly as possible at a measured distance from the photoped, metal plates pierced with vertical slits were fixed on each side of the lamp. The lamp having been removed, a thin steel rule was passed through these slits to form a stop for a measuring rod 30 cm. long; the other end of the latter rested against the face of the photoped. The steel rule and the measuring rod having been removed, the lamp was set up between the slits and its position was adjusted until the filament was as nearly as possible in the plane of the slits. This setting was inspected from time to time, but after about twenty sets of observations had been made it was found that the filament had warped, and that the warping was introducing an uncertainty of about 2 per cent. in the later sets of observations of the first series.

As no large battery of accumulators was available during the first series of experiments for giving a steady supply to an electric lamp, portable accumulators were used, and an osram lamp intended to give 10-candle power at 10 volts was tried, and was supplied by six accumulators controlled by an adjustable resistance. But a comparison with the pentane lamp showed that the colors of the lights differed too widely to make accurate photometry possible until the light of the electric lamp had been reduced to about 1 candle. It was hoped that a metallic filament lamp thus used would have an enhanced "life," or, in other words, would vary less by ageing than if worked at 10 candles. But the result was disappointing. It might have been better if the lamp had been worked at constant volts; but with the view of eliminating the effects of imperfect contacts, adjustment was made for working at a constant current. Another defect in the arrangement was the use of the electric lamp with the filament erect instead of hanging downwards. Notwithstanding the low candle power at which it was worked, the filament warped as has been mentioned.

The lamp took about 0.66 ampere. The exact value of the current was of no importance, but when once settled it was carefully maintained.

The arrangement used is shown in Fig. 1. The lamp L was supplied with current from the 5-cell battery B, the circuit was completed through an adjustable rheostat of carbon plates R, a manganin wire W of about 1.54 ohms resistance, and an ammeter A. In parallel with the wire W, a circuit contained a reflecting galvanometer G, a Weston cadmium cell C, and a double key K_1. A light pressure of this key completed the circuit through the high resistance R_3, which saved the cell from injury in case the lamp circuit was not completed. When an approximate adjustment of the current had been made, the key was pressed hard down and kept closed. Another circuit contained a resistance of 1,000 ohms, R_2, and a key K_2. When the current was adjusted and the galvanometer G indicated zero, closing K_2 gave a deflection corresponding to 0.35 per cent. difference of current. The current as a rule was kept steady within about one-tenth of this amount.

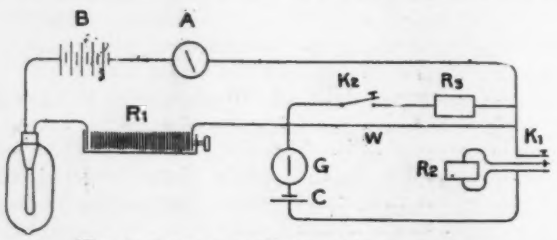


Fig. 1.—Diagram of Electrical Arrangements.

In the second series of experiments, a large battery being available, a Fleming-Ediswan photometric lamp standard was used, giving 10 candles at 60-05 volts with 0.7577 ampere. This gave no difficulty. The lamp holder was double-wired, and the volts were measured with a potentiometer.

Scope of the Investigations.—The investigations were undertaken primarily to establish the corrections applicable to the Harcourt pentane 10-candle lamp when the atmospheric conditions were other than normal. It seemed desirable, however, while the arrangements for making such investigations were available to extend them to the Hefner amyl-acetate lamp. Also a few observations were made on the effect of variations in the atmospheric conditions on the light afforded by the Metropolitan Argand No. 2 gas burner, by a flat flame (slit or batswing) gas burner, and by the English standard spermaceti candle. The results of these investigations, which were not so exhaustive as those on the Harcourt and Hefner lamps, will only be briefly mentioned at the close of this paper. Also the publication of detailed figures of the observations, and of certain deductions on the relations subsisting between the light afforded by flames and the composition of the atmosphere, must be reserved for a subsequent communication.

Procedure.—The procedure followed in making the testings was first to take photometric readings in the normal (or prevailing) conditions, then to modify the particular atmospheric condition, the effect of variations in which it was desired to study, and to take further readings. After several modifications of the same atmospheric condition had been made and readings taken, the original or normal conditions were, whenever possible, reverted to, and final readings taken thereon as a check on the initial readings. In the earliest sets of observations the readings thus obtained were corrected to normal in respect of variations in atmospheric conditions, other than those intentionally introduced, by employing Liebenthal's or Paterson's formulæ, if available, or otherwise presumptive formulæ. The readings thus corrected were platted on squared paper; and from the curve obtained therefrom the correction applicable to variations from the normal of the atmospheric condition which had been intentionally varied in the set of observations was deduced. The correction was applied in respect of the accidental variations in that atmospheric condition in subsequent sets of observations in which other atmospheric conditions were intentionally varied. By pursuing this procedure through a number of sets of observations, in which first one and then another atmospheric condition was intentionally varied, the corrections applicable in each were gradually deduced with greater and greater freedom from uncertainty. Finally, the results of the whole of the sets of observations were re-calculated with the aid of the corrections so deduced, and the figures thus obtained were re-plotted and any discrepancies thereby disclosed were examined. This procedure involved much tedious re-calculating of the results of the authors' observations, but it led ultimately to corrections being deduced, all of which were independent of the work or formulæ of other observers.

Corrections for Variations of Atmospheric Pressure.—The experiments made to determine the corrections for variations of atmospheric pressure were all carried out in the steel compression chamber already described. The range of variation of pressure for the observations was from about 450 to 1,000 mm. (or from about 17¾ to 39½ inches). The results of the observations were ultimately corrected for the variations in the proportions of aqueous vapor and of carbon dioxide in the air (according to the formulæ referred to later), and the corrected figures thus obtained have been plotted and give the curves shown in Fig. 2. The curves show that the relation between atmospheric pressure and the yield of light is not constant or expressed by a straight line. The falling off in the light with reduction of pressure is much greater at the lower than at the higher pressures.

Harcourt Lamp.—The curve for the Harcourt lamp is, however, nearly a straight line for the range of 700 to 850 mm., and shows that within these limits the light increases or decreases by 1 per cent., with an increase or decrease respectively in pressure of 12.5 mm., or that a variation of 10 mm. in pressure is attended by a variation in the same sense of 0.8 per cent. in the light afforded by the lamp. These figures agree exactly with the correction deduced by C. C. Paterson (Journ. Proc. Inst. of Elect. Engineers, 1907, XXXVIII., p. 280), which may, therefore, be accepted as correct for variations of pressure at about the neighborhood of normal. In regard, however, to the effect of variations of pressure elsewhere, the authors have failed to find a rational equation to the pressure curve for the Harcourt lamp, and prefer to give the curve of the differential co-efficient (shown in Fig. 3) rather than an empirical formula. By the use of this curve, the correction which should be applied to the Harcourt lamp for barometric variations at any place at which the mean barometic height is considerably below 760 mm. may be deduced.

Hefner Lamp.—The curve for the Hefner lamp is likewise nearly a straight line for the range of 700 to 850 mm., and shows that within these limits the light increases or decreases by 1 per cent. with an increase or decrease respectively in pressure of 25 mm., or that a variation of 10 mm. in pressure is attended by a variation in the same

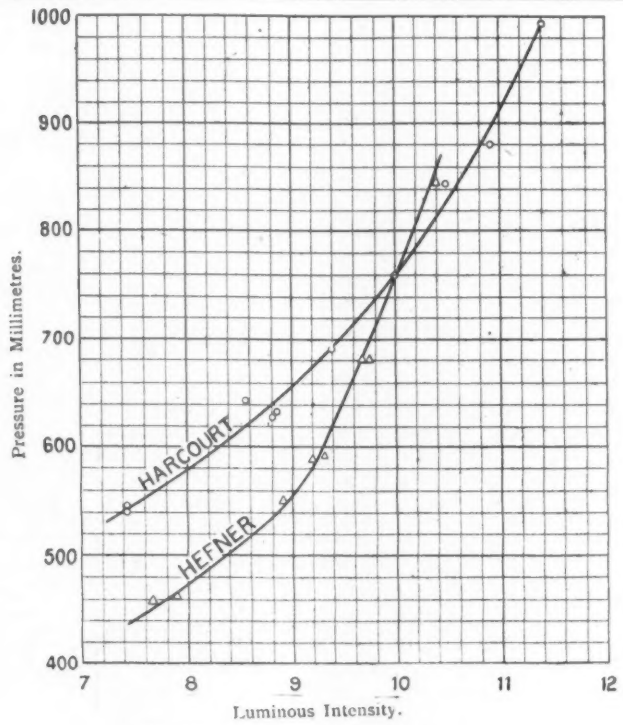


Fig. 2.—Effect of Variation of Pressure.

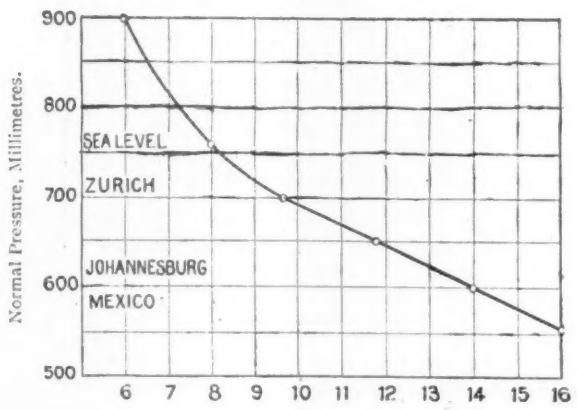


Fig. 3.

sense of 0.4 per cent. in the light afforded by the lamp. These figures differ from the correction deduced by Liebenthal from observations of the variations of the light of the Hefner lamp, caused by the natural fluctuations of the barometer between 735 and 775 mm. Liebenthal has adopted a formula according to which a variation of 10 mm. in pressure is attended by a variation of only 0.1 per cent. in the light. ("Zeits. für Instrumentenkunde," 1895, XV., 157, and "Praktische Photometrie," p. 121.) Paterson mentions that he found for 10 mm. variation in pressure 0.2 per cent. variation in the light. The authors have therefore found that, about the neighborhood of normal, variation of pressure has only half the effect on the light of the Hefner lamp which it has on that of the Harcourt; but, on the other hand, that it has for the Hefner lamp four times the effect shown by Liebenthal's formula, which has been very generally accepted. The facts that the effect of small barometric changes, such as Liebenthal had available, is small compared with the effect of the unavoidable changes in the proportions of aqueous vapor and carbon dioxide in the air, and that the proportion of the latter was not ascertained by Liebenthal, indicate that his formula for the correction to be applied to the Hefner lamp for variations of barometric height does not rest on acceptable data. The authors ascertained the proportions both of aqueous vapor and carbon dioxide in the air during the observations, and applied corrections to eliminate their effects, while the greater range of barometric change which they had at their disposal reduced the effect of unavoidable errors of observation on the final result. For these reasons, they believe that their figure of 0.4 per cent. should now be accepted in preference to Liebenthal's 0.1 per cent. for the effect on the light of the Hefner lamp of a change of 10 mm. in barometric pressure in the neighborhood of 760 mm. In regard to the effect of variations of pressure in other regions of the barometric scale, the curve found by the authors coincides fairly well with the results of observations made by Liebenthal in a pneumatic chamber, in which results, however, he appears to have placed but little reliance because of the presence of a number of disturbing factors.

Corrections for Variations in Atmospheric Humidity.—The experiments made to determine the effect of variations in the humidity of the air on the light afforded by flames were carried out partly in the steel chamber already described and partly in a small room at the Electrical Standards Laboratory of the Board of Trade at No. 8, Richmond Terrace, Whitehall, London. This room was 4.03 metres (13 feet 2¾ inches) long, 1.975 metres (6 feet 5¾ inches) wide, and 2.45 metres (8 feet 0½ inch) high. There was no pump for renewing the air of this room, but a hood attached to a flue pipe passing through the wall of the room was placed over the lamp, the heated products from which created a strong draught through the flue pipe. The proportion of aqueous vapor in the air was increased as required by passing steam into the chamber or room from a small boiler placed outside it. A large range in the proportion of aqueous vapor in the air was secured by choosing dry, cold days, on which observations of the light of the lamps when the humidity was low, could be made. The chamber or room having been heated by electric heaters, the air was then nearly saturated with steam at the high temperature. The range of humidity thus secured was from about 1 per cent. to over 4 per cent. by volume of aqueous vapor in the air. Sets of observations on the Harcourt lamp showed that a change in the temperature *per se* of the air from 8° C. to over 20° C. had no definite effect on the light afforded. The steam introduced was well disseminated in the air of the chamber or room by means of an electric fan. In one set of observations, greater initial dryness of the air was secured by exposing trays of granulated calcium chloride in the room for 12 hours, while circulation of the air over the trays was maintained by the fan. The results of observations were in all cases corrected for variations in the barometric height and in the proportion of carbon dioxide in the air. The results showed that the light of both the Harcourt and Hefner lamps decreases by 1 per cent. for an increase of 0.16 per cent. in the aqueous vapor in the air or that an increase of 1 per cent. in the aqueous vapor in the air is attended by a decrease of 6.25 per cent. in the light of the lamps. Liebenthal found 5.5 per cent. for both lamps ("Zeits. für Instrumentenkunde," 1895, XV., p. 157, and "Praktische Photometrie," pp. 118 and 128), while Paterson has found 6.6 per cent. for the Harcourt and 6.0 per cent. for the Hefner lamp (Journ. Proc. Inst. Elect. Engineers," 1907, XXXVIII., pp. 276, 277) as the decrease in the light caused by 1 per cent. increase in the aqueous vapor in the air.

Corrections for Vitiation of the Atmosphere by Combustion.—Experiments made to determine the effect of different degrees of vitiation of the atmosphere on the light afforded by flames were made on air vitiated, partially by breathing and partially by the combustion of pentane or illuminating gas. The ratio of carbon dioxide produced to oxygen consumed differs according to the composition of the fuel consumed, and the conposition of vitiated air will, therefore, differ according as the vitiation arises wholly or mainly from breathing, from the combustion of a hydrocarbon body such as pentane, or of the mixture of a number of combustible gases, in which hydrogen predominates, which constitutes ordinary town illuminating gas. In the experiments made by the authors, the proportions of both carbon dioxide and oxygen in the vitiated air were determined by analysis, and the somewhat complex results obtained will be dealt with more fully in a subsequent communication. But taking the proportion of carbon dioxide in the air as the sole measure of vitiation caused partially by breathing, but mainly by combustion of paraffine hydrocarbons or town gas, it was found that 1 per cent. decrease in the light of the Harcourt lamp was caused when approximately 0.035 per cent. of carbon dioxide was present in the air, and in the light of the Hefner lamp with 0.045 per cent. Or the presence of 0.01 per cent. of carbon dioxide in the air was attended by a reduction of 0.29 per cent. in the light of the Harcourt, or of 0.22 per cent. in the light of the Hefner lamp. In the experiments on which these figures for the Harcourt lamp are based, the proportion of carbon dioxide in the air ranged from 0.09 per cent. to 2.54 per cent., and of oxygen from 20.80 per cent. to 17.40 per cent, With 2.54 per cent. of carbon dioxide and 17.40 per cent. of oxygen, the flame of the Harcourt lamp was blue and practically non-illuminating. The diminution in light is fairly uniformly proportional to the increase in the amount of

carbon dioxide up to about 2 per cent. of the latter—*i. e.*, the curve given by the figures is nearly a straight line to that point. The experiments on the Hefner lamp were not made over so wide a range as those on the Harcourt lamp.

Some observations were made in an atmosphere in which the carbon dioxide was gradually increased by combustion to 1.87 per cent. while the oxygen in the air was maintained approximately at the normal percentage by a supply from a cylinder of compressed oxygen. These observations have no direct bearing on the effect of an ordinary vitiated atmosphere on the light of the lamps; but the results are interesting from a scientific standpoint, and will be published later.

General Formulæ for Corrections.—The corrections found for the Harcourt and Hefner lamps may be applied thus:

Let A = the accepted normal percentage of aqueous vapor in the air.
Let C = the accepted normal percentage of carbon dioxide in the air.
Let P = the accepted normal pressure of the air in millimeters.
Let a = the prevailing percentage af aqueous vapor in the air when the lamp is in use.
Let c = the prevailing percentage of carbon dioxide in the air when the lamp is in use.
Let p = the prevailing pressure of the air when the lamp is in use, then the actual tight (I') of the lamp at the time, expressed in terms of its light (I) in normal conditions will be found with sufficient accuracy for all practical purposes from the equations:

For the Harcourt lamp:

$$I' = \frac{100 - \left(\frac{a-A}{0.16} + \frac{c-C}{0.035} - \frac{p-P}{12.5}\right)}{100} I$$

For the Hefner lamp:

$$I' = \frac{100 - \left(\frac{a-A}{0.16} + \frac{c-C}{0.045} - \frac{p-P}{25.0}\right)}{100} I$$

Effect of Variations in the Atmospheric Conditions on the Light of Gas and Candle Flames.—The results obtained in the observations made on the flames of the No. 2 "Metropolitan" argand, and the Bray "$\frac{G}{L}$ 5 feet $\frac{15}{10}$" slit flat flame gas burners, when consuming the gas supplied in Chelsea and Westminster by the Gas Light and Coke Company, and on the flame of the English parliamentary standard spermaceti candle, must not be accepted as so trustworthy as those given for the Harcourt and Hefner lamps because they are based on fewer observations. These results are, therefore, given with reservation in the following tabular statement:

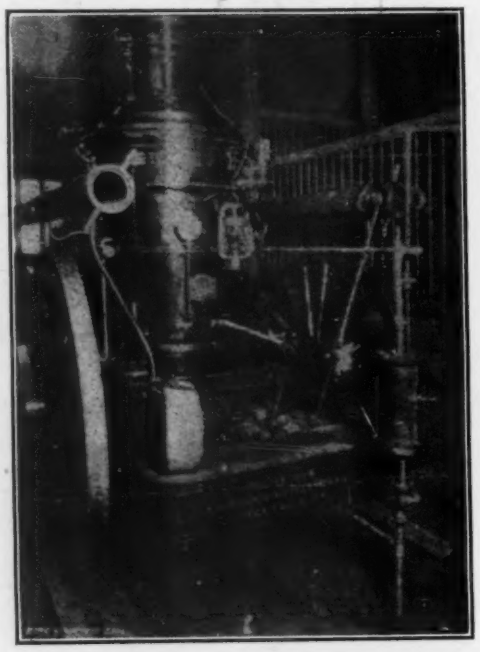
	One per cent. decrease of light is caused approximately by the following changes from normal.		
	Pressure. mm.	Aqueous Vapor. Per Cent.	Vitiation Expressed by Per Cent. CO_2.
No. 2 Metropolitan argand gas.	— 25	+ 0.20	+ 0.03
Flat flame gas.....	— 5	+ 0.11	+ 0.035
Spermaceti candle.....	— 20	+ 0.50	+ 0.04

These results indicate that small variations in the atmospheric conditions of a gas testing room will not appreciably affect the results of photometric comparisons in which the Harcourt or Hefner lamp is used as the standard of light, and that these standards will give as accurate results as are anyhow practically obtainable in determinations of the illuminating power of gas, if they are used in all ordinary circumstances without correction for any divergence from normal atmospheric conditions. In other circumstances, however, as in the testing of electric lamps by a flame standard, corrections are called for.

The Division of the Work of Observation.—The whole of the work involved in the investigations has been carried out by the authors personally. The work of making the observations as shared in this way: W. J. A. Butterfield remained in the experimental chamber or room and made all the photometric readings and a few air analyses, etc.; J. S. Haldane was also in the chamber or room except on a few occasions when the ventilation was inadequate and the presence of a second observer would have caused undesirable vitiation of the air; he made nearly all the analyses of air and readings of the hygrometer and other accessory apparatus in the chamber or room, controlled the atmospheric conditions therein and generally directed the course of the investigations; while A. P. Trotter had entire charge of the electric standard lamps used and controlled them from outside the chamber or room. When variations in the light of gas flames were being investigated, A. P. Trotter also made, simultaneously with the observations proceeding in the experimental room, observations of the illuminating power of the gas on a photometer which had been set up outside the room, in order that due allowance might be made for fluctuations in the illuminating power of the gas. The electrical and some of the photometrical apparatus was provided and arranged by him.

The Mangin Gas Heater for Fire Engines.

About the beginning of this year there was installed, in the house of Hose Company, No. 1, Muskegon, Mich., a novel heater to be used in the engine houses of public fire departments, to keep the apparatus with steam up at all times. As will be seen from the illustration,



Gas Heater Attached to Engine at Muskegon, Mich.

the apparatus is a very simple one, being connected by slip nipples which release automatically when an alarm comes in. It is so located that it in no way interferes with the progress of the machine when the same is on its way to a conflagration. The gas consumption is relatively small. When in full action the quantity used per hour is 30 cubic feet; and when standing in the house, the device takes up 15 cubic feet per hour, a volume amply necessary to maintain the requisite steam pressure. For this description of the apparatus we are indebted to Mr. P. Buckley, Commercial Manager of the Muskegon Traction and Lighting Company. In calling our attention to it Mr. Buckley says: "It is the invention of the Superintendent of our gas division, Mr. William Mangin, and it is working out so successfully that we believe it should be given as much publicity as possible, for certainly a great field is open for its use."

Atlanta Presents Good Evidence.

It may seem a long hark to December, 1912, and the Congdon-Brewer combination, but our excuse is the Atlanta (Ga.) Company, and they have determined to use every means to have the National Commercial Gas Association select their beautiful city as its meeting place in 1912. It will certainly not be news to our readers to be told that Atlanta is growing with great rapidity, or that that growth is of the most substantial sort. However, it is nevertheless likely that the growth and the nature thereof are not estimated at their real value. Messrs. Congdon and Brewer rightly think it is time that the South should have an innings at entertaining the Association—the very largest of them, too—and in order to prove their ability to house the visitors, be they ever so many in number, and ever so finically disposed as to living arrangements, they have forwarded to us the accompanying photographic views of the New Georgian Terrace Hotel.

Situated in the business heart of the city, accessible with ease from any point thereof, this beautiful structure (which will be completed by October 1st), the interior of which corresponds in finish and com-

fort to the elegance and harmony of its exterior. It has from 250 to 300 rooms, and the management thereof is to be of the up-to-date type. Atlanta has other hotels of magnitude and worth; so take it all-in-all, Associations need not fear naming Atlanta as a gathering place on account of lack of quarters wherein to suitably house the visitors to that busy Southern center.

A Narrative Concerning the Lighting of the Great Shops of the Brown & Sharpe Mfg. Co.

[Communicated by "B."]

Nearly four-score wears ago—to be precise, in the fall of 1833—Mr. David Brown, in company with his son, Mr. Joseph R. Brown, engaged in business, in Providence, R. I., with the object of manufacturing machine-made tools. There likely was no better practical mechanic along the indicated lines in the United States than the first-named; and as the father was so the son became. From the outset the business was successful, and in 1841 the senior member retired from active work. The son continued along the original way and system until 1843, when Mr. Lucian Sharpe purchased a partnership in the concern, the succeeding partnership being known to the commercial world as Messrs. J. R. Brown & Sharpe. Prosperity continued, and in 1868 the Brown & Sharpe Mfg. Company was incorporated. The manufacture of steel rules and like tools, or instruments of precision, was undertaken by Joseph R. Brown in 1850, and two years later Samuel Darling engaged in a similar sort of manufacturing. In 1866 certain negotiations resulted in the formation of the partnership entitled Darling, Brown & Sharpe, which firm carried on the instrument making section of the concern, and it so remained until (through the purchase of Mr. Darling's interest) the dissolution of the body. In sequence (1868) the Brown & Sharpe Mfg. Company took hold.

Great as the business of this wonderfully well-managed corporation

Fig. 1

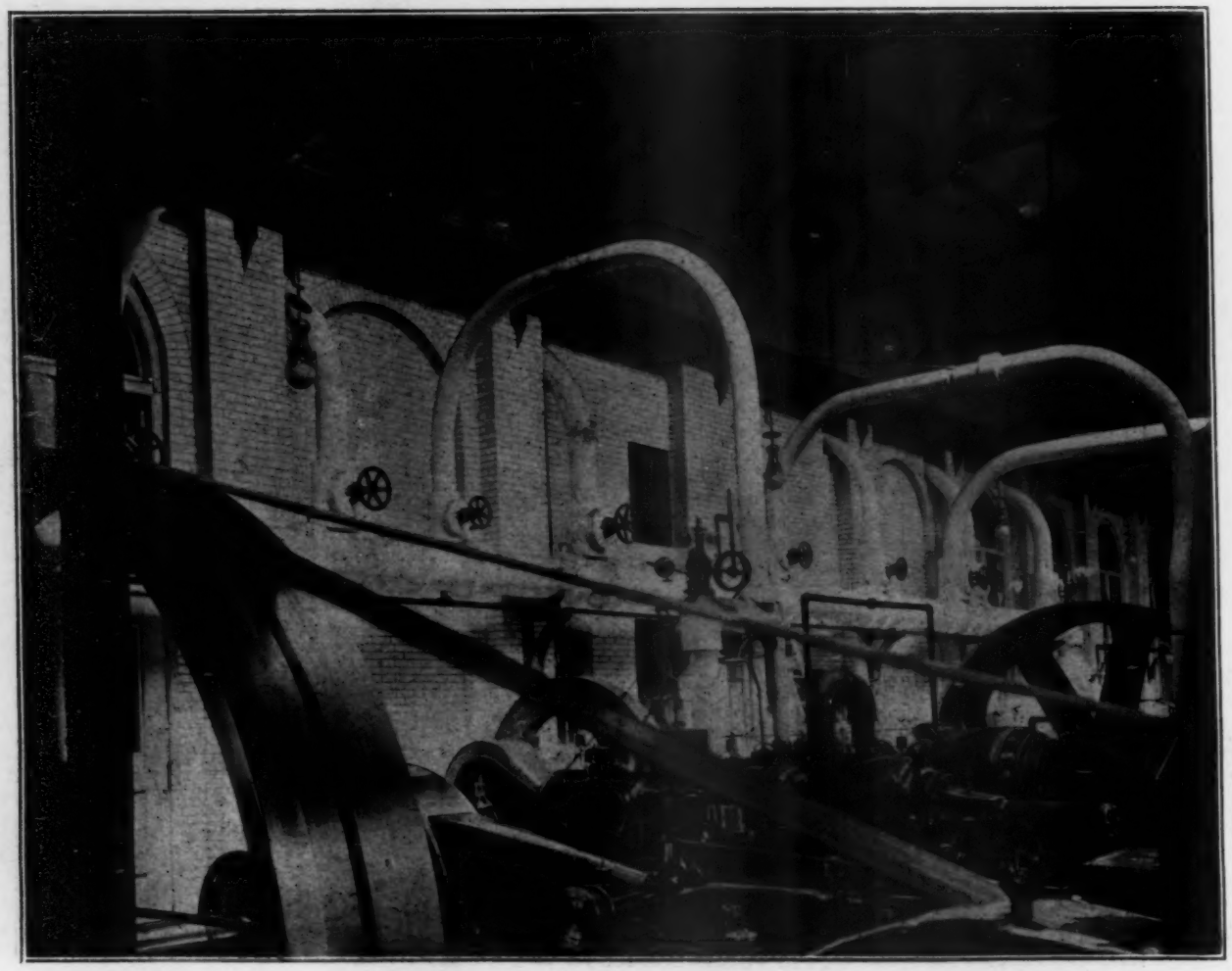


Fig. 2.

Fig. 3.

Fig. 4.

(Continued on page 154.

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NEW YORK, MONDAY, SEPTEMBER 4, 1911.

[Official Notice.]

Sixth Meeting, American Gas Institnte.

The Sixth Annual Meeting of the Institute will be held at St. Louis, Mo., on Wednesday, Thursday and Friday, October 18th-20th 1911.

The Headquarters will be in the Hotel Jefferson, and the meetings will be held in Memorial Hall, 19th and Locust streets.

The Committee on Arrangements has made preliminary plans for a banquet on Thursday evening, and an excursion on the river for Friday afternoon. The ladies will be entertained with an automobile ride and luncheon, Thursday noon, and a theater party on Thursday evening.

The Committee on Arrangements is composed as follows: C. L. Holman, Chairman; D. R. Russell, August Court, C. H. Quackenbush, A. C. Einstein, T. D. Miller, John Dell, C. H. Dickey, R. B. Hatton, R. A. Walsh, E. A. Downey, E. H. Boehnken.

The Chairman of the Technical Committee announces the following papers to be read at the meeting:

"Intensive Scrubbing and Condensing of Gas," by L. E. Worthing, Detroit, Mich.

"The Manufacture of Illuminating Gas in By-Product Ovens in the United States," by W. S. Blauvelt, Semet-Solvay Company, Detroit, Mich.

"Report on Verticals at Providence, R. I.," by Carroll Miller, Providence, R. I.

"Report on Verticals at Manchester, N. H.," by W. G. Africa, Manchester, N. H.

"Turbo-Blower," by an Engineer with the General Electric Company.

"Production and Market for Sulphate of Ammonia," by an Engineer with the New England Gas and Coke Company, Boston, Mass.

"Tar Distillation and Market for Its By-Products," by Alan D. Whittaker, Atlanta, Ga.

"Actual Leakage in Unaccounted for Gas," by J. D. von Maur, St. Louis, Mo.

"District Holders and Their Place in a Distribution System," by R. M. Griswold, Denver, Col.

"Flow of Gas in Mains," by J. W. Battin, Detroit, Mich.

"U. S. Government Report on Electrolysis," by S. W. Stratton, Bureau of Standards, Washington, D. C.

"Pacific Coast Conditions," by John A. Britton, San Francisco, Cal.

"Photometric Work," by C. O. Bond, Philadelphia, Pa.

"Cost and Results Obtained from Automobile Delivery," by L. R. Dutton, Wyncote, Pa.

"Valuation of Public Utilities," by H. C. Abell, New York city.

There will also be some interesting Committee Reports, and the Report of the Editors of the Wrinkle Department and Bureau of Information. It is possible that arrangements may be made for a Lecture on "Some Recent Developments in Gaseous Combustion."

At a regular meeting of the Board of Directors, held August 19th, 1911, the following gentlemen were elected as the Nominating Committee: C. H. Nettleton, Chairman; Jas. H. Jourdan, W. H. Gartley, James Ferrier and J. H. Eustace.

In case of inability to serve, the following gentlemen were named as alternatives: J. A. Britton, T. G. Jones, C. M. Cohn, J. D. von Maur and H. M. Moore.

A. B. Beadle, Secretary.

[Official Notice.]

Twentieth Annual Meeting, Michigan Gas Association.

The Twentieth Annual Meeting of the Michigan Gas Association will be held in Detroit, Mich., September 20, 21 and 22. Headquarters will be the Hotel Pontchartrain. A most interesting programme of papers has been prepared as follows:

"The Function of Tar in the Condensation of Coal Gas," by Prof. Alfred H. White, and the Holder of the Scholarship.

"Advertising: A Brief," prepared by C. A. Brownell.

"Experiments in the Taylor System of Shop Practice, by "Ben." M. Ferguson.

"A Purchasing System for a Gas Company," by Albert G. Schroeder.

(a) "Use of Reinforced Concrete in a Gas Works," by H. W. Douglas.

(b) "A Concrete and Wood Condenser House," by E. F. Lloyd.

"Filament Ignition of Gas," by Prof. Howard Lyon.

"Development of the Hotel and Restaurant Gas Appliance Business," by W. F. Clausen.

"Directions for the Recovery, Concentration and Testing of Ammonia," by James A. Brown.

In a city the size of Detroit there is so much of interest to one and not to another, and so little that can be covered in the time allotted, it has been decided to make the entertainment features as elastic as possible to the end that all tastes may be suited.

The central feature of the programme will be two theater parties, one evening to be spent at Detroit's big vaudeville house "The Temple," and the other at whichever of the regular theaters offering the best programme—the booking for that week being not yet reported.

Wednesday and Thursday, the 20th and 21st, will each have two business sessions, and it is the intention to hold these on schedule time so as not to make it necessary to interfere with the other arrangements.

At the close of the afternoon sessions, on Wednesday and Thursday, automobile accomodations will be provided for all holders of entertainment tickets, either gentlemen or ladies. Automobiles will be at their disposal, for 2 hours, from 4 to 6 o'clock, to make such a tour of the city and visit such points of interest on the American side of the river as they may desire, dropping them at any hotel or inn desired at 6 o'clock. Parties for the automobile trips should be made up well in advance in order to insure the most congenial company to everyone.

Friday, the 22d, will be devoted entirely to factory inspections, including probably the Packard or the Ford automobile plants, various gas works, stove and appliance factories, special industrial installations, etc., and members desiring to visit any particular point on this day will insure proper accommodations by notifying the secretary well in advance.

For the convenience of those attending, the entertainment programme will contain a complete list of all points of interest, as well as the best places to lunch, dine, etc., together with minute directions for getting there. There are so many places on both sides of the river reachable by automobile, trolley and boats, which are both interesting and beautiful, that a large attendance should be brought out, not only among the members, but of those from a distance as well.

For the convenience of those who may desire to stay over for a side trip Saturday and Sunday, we will give a list of boat schedules to the Flats, Put-in-Bay, Cleveland, Buffalo, Niagara Falls, etc.

The hotels with which the members will be most interested are these: Pontchartrain, Cadillac, Hotel Tuller, Griswold House, The Wayne and the St. Claire. As the Michigan State Fair will be held in Detroit during the week of the meeting of the Michigan Gas Association, it will, of course, be the part of wisdom to make hotel reservations at the earliest possible moment.

We are endeavoring to arrange this entertainment programme so that there will be no temptation to neglect the technical sessions, for we have a programme which will be interesting, important and of value to those in all departments of the gas business.

The entertainment programme became an assured success the moment the committee appointed Messrs. R. Shacklette, L. B. Young and W. S. Blauvelt.

Yours very truly,

Glenn R. Chamberlain, Secretary-Treasurer.

[Official Notice.]

Seventh Annual Convention, National Commercial Gas Association.

Considerable interest is being noted throughout the entire gas industry over the coming Convention and Exhibition of gas appliances of the National Commercial Gas Association, to be held in Denver, Col., October 23 to 28. From the standpoint of the manufacturers the exhibition will be a complete success, as their hearty co-operation and early contracting of spaces have now assured every space in the Hall being taken.

The attendance is expected to eclipse any former meeting of gas men ever held. The Association is now recognized throughout the country, and has demonstrated upon former occasions its ability to offer every facility for bringing the gas men from all parts of the country together, not only to meet the manufacturers, but to meet on a common ground and discuss the vital questions which are of paramount importance to the industry. Assurances from all sections of the country leave no doubt as to the attendance, which will probably establish a new record for conventions of gas men.

The membership of the Association is steadily growing in a most satisfactory manner, and, with the advantages offered to members through its monthly "Bulletin," its educational course for salesmen, formation of company sections and standardizing handbooks of appliances, should be enjoyed by all. No gas man should hesitate an instant, but join at once.

The Membership Committee has offered two prize trips to the Den-

ver convention to the members securing the highest percentage of increased membership, based on the relation which the number of applications bears to the population of the city from which received, thus offering an equal opportunity to men in a small community with those in large situations. The prizes will be worth approximately $125 each—surely well-worth trying for. Details of the plan have appeared for several months in the monthly "Bulletin" of the Association.

Paper Programme.—The list of papers has been carefully selected this year, with a view to offering as wide a range of subjects as possible, and the discussions should prove most interesting and instructive:

"An Equitable Sliding Scale for the Sale of Gas." Editor not yet selected.

"Up-to-Date Advertising Methods." T. R. Elcock, Jr., Advertising Manager, the U. G. I. Co., Philadelphia, Pa.

"Illuminating Engineering and Its Application to the Gas Industry." E. L. Elliott, Editor, "Illuminating Engineer," New York City.

"Exhibit and Description of Model Glass Gas Works." A. F. Traver, Supt. Gas Dept., Denver (Col.) Gas and Electric Co.

"The Modern Gas Fixture." Chas. Ummach, Sec., R. Williamson Co., Chicago, Ills.

"The Designing and Construction of Gas Appliances." R. E. Clark, George M. Clark Stove Co., Chicago, Ills.

"Increased Efficiency in Scientific Office Accounting." P. R. Jones, Auditor, Doherty Operating Co., New York City.

"Practical Demonstration Work." Mrs. Anna A. Carroll, Demonstrator, the U. G. I. Co., Philadelphia, Pa.

The entertainment features will, without doubt, prove too alluring to resist. The Committee has indeed reason to feel proud of the novel chain of features which will be presented to those attending the meeting. Besides the usual theater parties, auto rides through the city and suburbs, "smoker" for men, luncheons and receptions for the ladies, of particular interest will be the 3-day trip (following the closing of the business session) through the mountains, including a specially arranged cowboy, chuck-wagon dinner in the "Garden of the Gods," followed by a real rough-riding exhibition.

Colorado offers every facility for a real holiday trip, embracing features which could be arranged in no other locality, and the atmosphere of the "Far West" is indeed a strong drawing card and should be given serious consideration. You cannot afford to lose such an opportunity, which may never occur again, not only from a business standpoint and the value of such a meeting, but also for the benefit such a trip will be to you.

Special trains have been arranged for by the Association to leave Chicago, October 22d, at 5 P.M., arriving in Denver Monday evening, 7:30; leaving St. Louis, October 21st, at 2:15 P.M., arriving at Denver October 22d, at 5:35 P.M. It has not been possible to secure reduced rates, all the passenger associations having declined to make concessions, therefore, the full fare will be charged. The expense of the trip will, of course, be gauged by the distance members must travel and the hotels selected. Full details of hotel accommodations, etc., will appear in the September issue of the monthly "Bulletin" of the Association, and any gas man not a member of the Association may procure a copy of same by addressing the Secretary, Mr. Louis Stotz, at 29 West 39th street, New York. Our Colorado friends extend to you a cordial invitation to be present during the week of the Convention, and assure you of a most interesting trip.

BRIEFLY TOLD.

HAVE YOU HEEDED THE WARNING?—It is to be hoped that all those eligible to membership in the American Gas Institute, and who are proposing to avail themselves of that right this term, have given due heed to the recent letter by Mr. J. D. Shattuck (Chairman, Membership Committee) impressing the fact that, unless their applications are in his hands by the 15th inst., they cannot be acted upon in time for the October convention. Further, such neglect will preclude them from obtaining a copy of this year's "Transactions."

THE QUEENS' BOROUGH RATE DECISION.—The Public Service Commission, First New York District, after a thorough and impartial hearing, over complaint made by certain residents of the Brooklyn-Suburban district (which mainly includes the Rockaway sections of Queens County, N. Y.), served by the Queens' Borough Gas and Electric Company, handed down the following ruling:

From July 1, 1911, to January 1, 1912, $1.20 for 1,000 cubic feet of gas; from January 1, 1912, to July 1, 1912, $1.15 for 1,000 cubic feet of gas; from July 1, 1911, to July 1, 1912, 13 cents per kw.-hour of electricity. The existing rates, or those complained of were: Gas, $1.30 per 1,000; electricity, 15 cents per kw.-hour, and it was sought to have these reduced to those charged in the districts supplied by the companies doing business in the Brooklyn Union Company's territory—gas, at 80 cents per 1,000, for instance.

The Commission was largely influenced by the U. S. Supreme Court presentings in the late case against the Consolidated, Brooklyn Union and other Companies. In one respect, however, the decision differs radically from the Washington decision, in that it is held by the New York Commission, that a gas company is entitled to enjoy the usufructuary benefit inherent to an increase in land values, owned by it for no matter what period of time.

ENTERTAINMENT PROGRAMME, NATIONAL COMMERCIAL GAS ASSOCIATION.—President Stannard, Mr. Joseph A. McMell, Vice-Chairman, and their associates, as Publicity, Exhibition and Entertainment Committee, respectively, of the National Commercial Gas Association, have evolved a splendid plan of entertaining those who will visit Denver in October, in connection with the Association's 1911 meeting. In proof of this we submit the following condensed statement respecting the programme as at present arranged:

The programme for the entertainment of the members of the National Commercial Gas Association, who hold their convention in Denver next October, is practically completed. The arrangement, which is thought to be the most novel ever attempted for a convention party visiting Denver, includes trips to Colorado Springs, Cripple Creek and over the Moffat Road. The latter excursion is an innovation at gas conventions. The visitors will be taken to the top of the "Continental Divide," where a dinner of venison, bear meat, grouse and mountain trout will be served. It is thought this feature will be one of the most enjoyable on the programme.

It is, however, but a part of the wonderful trip over the Moffat Railroad, This railroad penetrates a section of the Rocky Mountains which early day railroad builders considered impossible; but the engineers who laid the plans for the construction of the road established a precedent. They ignored the practice of the early day constructionist of following a stream along its course, so that a natural grade could be secured.

The Moffat Road begins to rise above the water line shortly after leaving Denver, continuing on and up the rugged slope of the mountain range until it eventually reaches and crosses the Continental Divide, 11,660 feet above the level of the sea.

On the way up the lower range to the top of the Continent the train passes through 55 tunnels, some of which are mere arches of rocks suspended above the tracks, while others are several hundred feet long. On emerging from the portals of these caverns a magnificent panoramic view of the plains far below to the east is afforded the traveler. The largest towns within the focus of the eye appear as mere specks on the landscape, while the numerous rivers and lakes look like flecks of silver sparkling in the sunlight. Shifting the gaze nearer the tracks, the passenger may, on looking into the yawning depths of the mountain canon, see the brawling torrents of a mountain stream tearing their way through the unlovely gulches far below. The great, roaring sound of these waters is almost entirely lost to the ear of the traveler so far above their course.

Rugged, perpendicular, walls of rock, hundreds of feet high, outline the tracks for miles. The rocky fastnesses of these cliffs are the haunts of mountain sheep which may frequently be seen from the trains. This is the beautiful "Gore Canon," the scenery of which is surpassed by no other canon in the world. It is a trip of thrills in a region of sublime grandeur which will make an everlasting impression on the minds of the visitors.

Eventually, the top of the Continent is reached. Here another surprise awaits the visitor on his initial trip to this section. It is the land of perpetual snow. In some places in this district snow banks, 50 feet high, are encountered, which are the accumulation of years. The snow banks from one frigid season, partially melted in the rays of the summer sun, endure until the pearly precipitation heralds the coming of another winter. This affords the visitor an opportunity of enjoying snow-balling, a pastime frequently to be engaged in by tourists to this section; and this only within 3 hours' ride of Denver.

On the top of the Continent the Atlantic seacoast falls away to the east, while the Pacific coast, by a series of easy grades, blends into the west. The visitor to this section will have an opportunity of seeing a Rocky Mountain sunset. This is a marvelous spectacle. The myriad rays of the setting sun, reflecting on the pearly snow banks, form a sight too broad for the imagination to perceive.

Directly to the west of this section rises the stately "Long's Peak," one of the highest mountain peaks in the world. Some hundreds of feet below its rocky summit are the white capped tops of the snowy range. Further down an intervening valley, redundant in the verdure of the evergreen pines, forms a striking contrast from the virgin whitness of the peaks high above. It is expected that this will be one of the most enjoyable trips included on the programme.

The trip to Colorado Springs is entirely of a different order. The scenery in this section is also beautiful and the queer formations of the rock will be viewed with much interest. The attractions at Cripple Creek and Denver are equally interesting, and will be enjoyed by all.

THE LIGHTING OF THE HOME.—The practice of caring for the lighting appliances of consumers is now in force among a large majority of gas companies, two methods being used: Rental maintenance where the appliance remains the property of the company, and straight maintenance of the consumers' apparatus. Either method will produce good results, but unfortunately their application is confined largely to stores, factories and semi public buildings, the lighting of the home being usually left to the householder. Maintenance rates are in greater evidence than corps of solicitors, canvassers, representatives and illuminating engineers. Consumers have the privilege of utilizing this service, but the benefits are rarely brought forcibly to their attention. Home lighting campaigns have been signally successful, in Chicago and Detroit and many other cities, and it cannot be truly said that gas companies have an effective maintenance department unless home lighting be included among their strenuous instead of passive activities.

(*Continued from page* 151.)

is, the magnitude thereof, for anything enabling real comprehension thereof, must be gained through personal inspection. Situated possibly ½ mile from the very center of the city of Roger Williams, and 5 miles away to the northwest of the Union Railroad station, are the Company's great shops, a view of which is shown in Fig. 1. The main manufacturing buildings cover a floor space equalling 545,000 square feet,, and the foundry adds thereto an additional floor space of 239,000 square feet. Compare these figures with those of 1853. Then the total floor space counted up 1,800 square feet; in 1911 the space available in all the buildings amounts to 961,000 square feet, and the structures cover 12 broad acres. Furthermore, the layout, being of the modern type, is all up to present day requirements; and every structure is planned and built with a view to causing the same to be as near fireproof as the present day practice in that respect is possible. The illumination of the different sections of an establishment like this, out of which are turned articles varying from a "vernier calipers" to milling and other machines, the weights of which go into several figures, requires much that is out of the ordinary.

The power station of the plant amongst other huge items, carries apparatus for the generation of 1,700 electrical horse power for small motor use, and this very electrical station has this year been equipped with Humphrey, No. 3 burner, inverted gas arcs. Fig. 4 shows the department devoted to the making of automatic screw machines, which are used in the manufacture of the Humphrey arc lamp itself.

It will be noted that the lamps are hung below the belting; nevertheless the maintenance does not exceed 3-tenths mantle per month over the entire installation, which now numbers 320 arcs, with constant additions being made thereto. The maintenance is in charge of one man, and he cleans the globes and lamps, maintaining also the proper adjustment. While it may not be a part of this description to allude to the matter, it nevertheless gives me satisfaction to say that this work (which is so necessary to the care of any sort of lamp) is attended to in the B. & S. shops by a man who neither neglects nor shirks his duties.

The preliminary tests, and the mechanical work connected with the gas arc installation, were under the care and direction of Mr. W. T. Hatch, the capable mechanic and courteous gentlemen who acts in the capacity of Mechanical Engineer to the Brown & Sharpe corporation.

There was no "kissing gaining favor," in these preliminaries over the lighting of the shops, for it was not determined to make practical use of gas arc lamps until after thorough and exhaustive testing thereof. The trials led to the selecting of the Humphrey No. 3, inverted type of arc, equipped with anti vibrators. The piping, lay out and the precise details of the equipping were under the capable direction of Mr. Samuel Greer.

The service of gas to the shops, of course, is under the control of the Providence Gas Company, and the flow is measured by the following services and meters (independent section services naturally is the rule), to wit:

Services.	Meters.
Two 4-inch.	Three 500-light.
Four 3-inch.....	One 300- "
One 2-inch.....	One 250- "
One 1¼-inch.....	One 200- "
....	One 150- "
....	One 10- "
....	Four 5- "

Another feature worthy of mention at the current time is that quite a job of new construction work is being carried on in the basement of the power house. The work goes on during the 24 hours, and the artificial illumination necessary is yielded by 3 Humphrey arcs temporarily served by movable piping. The workmen easily and conveniently make the required moves as to the light centers, which is good proof of the flexibility of the gas arc, even in an electric power plant.

The shopmen, at work even on the finest micrometer devising and finishing tasks, are eloquent in their testimony respecting the ease with which their jobs can be accomplished, the main thanksgiving over the substitution, however, being the far less discomfort as to the quality of the illumination afforded as compared with that theretofore given by arc and incandescent electric lamps.

Useful Shop Kinks.

By W. H. Matlack.

These "kinks" are submitted in the hope that they may be as useful to others as they have been to the compiler:

Fig. 1 shows a method of making a loose back frame for framing charts, licenses, calendars or the like. Fig. 2 displays a pipe hanger which can be readily made for any size pipe that is to be suspended, either in indoor or outdoor work. The turnbuckle is used to adjust pipe to the desired grade.

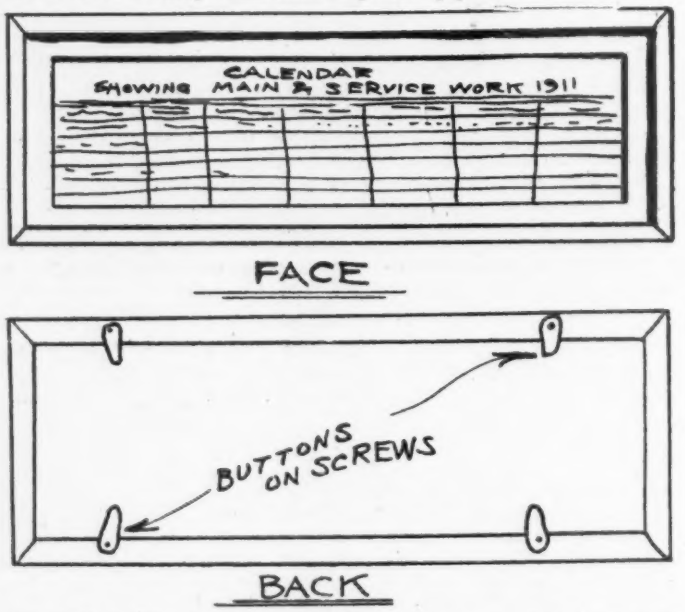

Fig. 1.—Method of Framing Charts, Calendars, etc., with Loose Back for Removing Same.

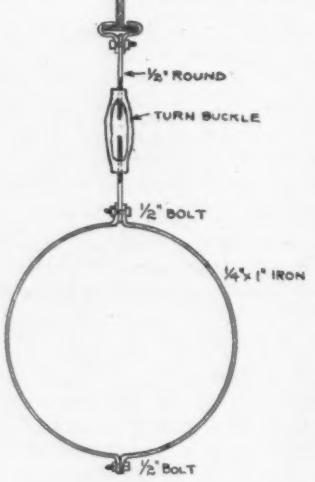

Fig. 2.—Pipe Hanger.

Fig. 3 portrays a shop made bench for the draughting room, which is at once easily made, can be moved without bother, and costs but little to construct.

The concluding table gives the weight and lengths of yarn going with piping jobs, and so will be found useful in the time of making estimates.

Length.	Weight.
1 ft.	5.33 oz.
3 ft.	1 lb.
15 "	5 lbs.
30 "	10 lbs.

Fig. 4.—Yarn.

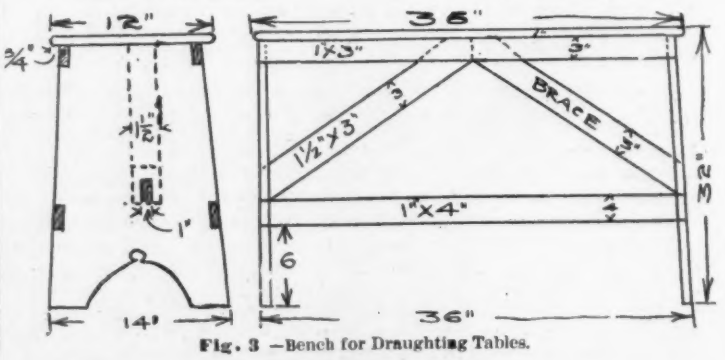

Fig. 3.—Bench for Draughting Tables.

The authorities of Kendalville (Ind.) have awarded to the Western Gas Construction Company, of Fort Wayne, Ind., a contract for furnishing 75 ornamental lamp posts, to be used in carrying lights employed on street illumination account. The posts are of the Company's standard type, which have found, in fact are finding, great favor with those in charge of arranging for public lighting matters.

Constant Volume of Air for Gas Generators.

Recent investigation of present day practice in gas houses reveals the fact that the successful operation of water gas sets largely depends primarily upon constancy of volume of air supplied the generator, not upon constancy of pressure. By furnishing a constant volume at high pressure the blast period is cut down, permitting a longer "making period," which results in a material increase in the capacity of the gas generator. To maintain this constant volume, regardless of the varying resistances of the fire, a gate or ture pierced disk will serve, although the Venturi tube is coming into general use. The constant volume is a result of maintaining a differential of pressure through the tube; in other words, if the drop of pressure is kept constant, the volume per any given unit of time will be a constant; therefore, a valve is placed in the tube to open or choke the pipe as much as is necessary to maintain the constancy of the pressure drop.

To operate the water gas blowing set for these conditions, the speed is maintained to deliver the maximum volume required at a pressure which will drive the desired volume through the fire, regardless of the existing back pressure due to clinkering, etc. To run a blower at such high speed requires, in the case of a steam driven set, that the turbine be developed for this special service, capable of giving a blast pressure considerably over 30 inches W.G. In some recent tests with very large blowers, driven by Terry turbines, over 40 inches W.G. was maintained.

Text of the Haverhill Decision, in the Matter of an Issue of Additional Stock, Massachusetts Board of Gas and Electric Light Commissioners.

Interlocutory Ruling at a Session of the Board in Haverhill.—The Haverhill Gas Company is applying for the approval of an issue of new capital stock of the par value of $900,000, the proceeds to be used in acquiring all the tangible property, real and personal, of the Haverhill Gas Light Company, and other property to be added to or for the improvement of the property thus acquired.

The petitioning Company, the Municipal Council and certain residents and customers of the Haverhill Gas Light Company have been severally represented by counsel. The presentation of the evidence by the petitioner has been interrupted by the suggestion that no part of the proposed capital stock can be lawfully used for the purpose of acquiring the property of the Haverhill Gas Light Company, and that it would be unlawful in any event to issue for such purpose the amount of stock proposed by the petitioner. The legal questions involved have been ably argued. Although the presentation of the evidence of the petitioner was not concluded, the Board understands that all the facts material to a decision of the questions raised have been brought to its attention.

The Haverhill Gas Light Company was originated under a special legislative act and began the supply of gas in Haverhill in 1853. It has ever since continued to supply gas, and is now the only company engaged in the sale of gas in Haverhill. Its capital stock, which was originally $45,000, was increased in 1871, or 1873, to $75,000, which is the present par value of the outstanding stock. In July, 1899, all of the capital stock was purchased by the Haverhill Gas Securities Company, a corporation organized under the laws of this Commonwealth. The Securities Company, having authorized and issued capital stock of $500,000, proceeded to issue and sell its collateral trust, 5 per cent., 20-year debentures, for the full amount of $500,000, secured by a deposit of the entire capital stock of the Gas Light Company with a trustee, and by a mortgage by the Gas Light Company of its plant and property to the same trustee. The property of the Securities Company is the equity in the capital stock of the Gas Light Company, and the debentures have no other security than that described.

In 1909 Messrs. Stone & Webster, of Boston, and their associates, having previously had no financial interest whatever in the Securities Company, acquired all of its stock and bonds, and in the latter part of that year assumed and have since continued to exercise the active management of the Gas Light Company. The stock may not have all been secured in 1909, but either in 1909 or 1910, prior at all events to the bringing of this petition.

The Haverhill Gas Company, the petitioner, was organized on April 7, 1910, under the provisions of chapter 110 of the Revised Laws, with an authorized capital of $5,000, for the purpose of "making, selling and distributing gas for lighting, heating, cooking, chemical and mechanical purposes in the city of Haverhill." The original capital was at that time duly subscribed for, to be issued subject to the approval of this Board; and at what purports to be a meeting of the stockholders on January 7, 1911, it was voted to increase the capital stock to $900,000. Messrs. Stone & Webster and their associates, who, as has been stated, are the owners of the stock and bonds of the Haverhill Gas Securities Company, are and will be the owners of all the stock of the Haverhill Gas Company.

The Municipal Council of Haverhill, having under the charter the authority of Mayor and Aldermen under the general law, passed an order on June 30, 1910, the body of which is as follows:

Ordered, That, subject to all conditions hereinafter set forth as to the time when this franchise and consent shall become effective, and as to the time when any rights or privileges thereunder shall accrue to the Haverhill Gas Company, and subject, further, to all other terms, conditions and restrictions herein provided, the consent of the city of Haverhill and of the Municipal Council thereof is hereby given to the Haverhill Gas Company, hereinafter called the "Company," to lay, erect, maintain and use in and under the streets, lanes and highways of said city, as the same shall from time to time exist, hereinafter called the "streets," gas pipes, mains and appurtenances thereto for the distribution of gas for heat, light, cooking, chemical and mechanical purposes, and to that end for such purposes to dig up and open said streets. The consent of the city of Haverhill and of the Municipal Council thereof is hereby further given to the Company to maintain, renew, restore, replace and use in, on, over and under the streets, such gas pipes, mains and appurtenances thereto as the Company has or shall have legally acquired from the Haverhill Gas Light Company and to that end and for such purposes to dig up and open said streets. The foregoing consents and grants are given for the purposes aforesaid and in accordance with and for the purposes of section 25 of chapter 121 and section 76 of chapter 110 of the Revised Laws. All the foregoing franchises and consents are hereby expressly given the Company in consideration of its acceptance of the terms hereof, and of its written contract, hereinafter referred to, and subject to the terms, conditions and restrictions following.

The terms, conditions and restrictions contained therein, which are not quoted, relate to the price of gas to private consumers and to the city of Haverhill, provide for annual payments by the Company to the city in possible excess of taxes, so as to produce certain stated amounts, the opening of the public streets, inspection of the Company's books and accounts, the capitalization of the Company, the termination of the franchise and consent, and the date when it should begin to be operative. This franchise and consent were to become effective as soon as, but not until, certain things were done, provided they were done before October 1, 1910. These things include a formal acceptance of the franchise and consent and the contract to perform all of the terms and conditions thereof, a contract by the Haverhill Gas Light Company of like tenor and effect, a declaration of trust by the Gas Light Company for the distribution of $21,000 among its customers, so as to make the reduction in price relate back to July 1, 1909, and the deposit of $21,000 under the trust so created. All that was thus required to be done by the Haverhill Gas Company or the Haverhill Gas Light Company before October 1, 1910, was duly and seasonably performed.

In 1900, upon complaint of the Mayor of Haverhill, this Board ordered the Haverhill Gas Light Company to reduce the price of gas from $1 to 80 cents per 1,000 cubic feet. The Company refused to obey this order and brought suit in the United States Court to enjoin its enforcement. This case, some time in 1907 or 1908, was referred to a Master, who later, in 1908 or 1909, began hearings upon the issues involved.

While these hearings were pending the Municipal Council of Haverhill, on December 23, 1909, acting under Section 2 of Chapter 34 of the Revised Laws, passed the first vote favorable to the acquiring of a municipal gas plant. The officers of the Haverhill Gas Light Company thereupon submitted to the Municipal Council certain proposals relative to the price and improved service, but conditional upon a settlement of the pending litigation. Modifications of the original offer were subsequently made: First, by the old Company; but later, after its organization, by the new Company, the petitioner in this case. After a public hearing and considerable delay for its further consideration, the Municipal Council passed the franchise and consent already described, and containing, in a modified form, the proposals originally submitted by the Gas Light Company. Meantime a

proposition for a second vote in favor of a municipal gas plant, required by Section 2 of Chapter 34 of the Revised Laws, was offered in the Municipal Council and laid on the table, where it has ever since remained.

When the knowledge of these facts was brought to the attention of this Board, on the assumption that a practical solution of the long pending controversy had been found which was satisfactory to the community immediately concerned, the Board assented to the entry of a final decree in the suit pending in the Federal Court enjoining the enforcement of the order adopted in 1900.

Some of the facts which have been stated may not be material to a decision of the issue immediately before the Board, but they are stated because they have been frequently referred to in the discussions, and in order that the hearing of those which are material may not be misunderstood.

The Municipal Council was within its undoubted rights when it took the first vote in favor of a municipal gas plant and looking to the probable acquisition of the property of the Gas Light Company, and thereby incidentally ending the pending 10-year controversy with that Company. In respect to this matter, it owed no duty to the Courts or to this Board, and in considering the expediency of the proposed municipalization, the amount which the city might have to pay for the Company's property, the price which the municipal plant when established might have to charge for gas in comparison with the price which the Company in operation was charging, or might in future charge, for its gas, were all matters of vital importance and material. The Municipal Council also acted within its undoubted rights in granting its consent to a new Company to dig up and open the streets for the purpose of laying gas pipes therein, and this grant, no appeal having been made to this Board by any party aggrieved, is final and conclusive.

The foregoing facts, together with the testimony of the petitioner as to the value of the property of the Haverhill Gas Light Company, having appeared, it was contended on behalf of the Municipal Council that the petitioner, the Haverhill Gas Company, cannot lawfully apply the proceeds of new capital stock to the purchase of the property of the Haverhill Gas Light Company for the reason that both the statute (Revised Laws, Chapter 121, Section 13) and the common law forbid the latter Company to dispose of all its property without special legislative authority, and that the entire transaction will amount in substance and effect to a stock dividend or a division of the proceeds of the sale of stock among its stockholders, which is expressly prohibited by the Revised Laws, Chapter 109, Section 20.

Counsel for certain gas consumers also raised some questions as to the validity of the so-called "franchise-and-consent" granted to the Haverhill Gas Company.

It was contended, on behalf of the petitioning Company, that the Haverhill Gas Light Company may lawfully sell its property to the petitioner, and that where such sale is made, as in this case, for the purpose of liquidating the affairs and winding up the corporate existence of the former Company, it is neither in law nor in fact a stock dividend nor a division of the proceeds of stock among its stockholders for the petitioner to issue capital stock to the amount of the fair value of the property which it is to acquire.

In the case under consideration the same persons own and control the corporate destinies of both the old and the new Companies. The same plant will continue to supply gas in the city of Haverhill, whether its ownership is retained by the old Company or acquired by the new. The same persons will continue in the control and ownership of the respective stocks of the two Companies, whichever may hereafter own and operate this plant. If it should happen, as has been suggested, that the bonds of the Securities Company should be cancelled and that Company be dissolved, the present owners of its stock and bonds would become the direct and immediate holders of the stock of the Gas Light Company.

From the explanation of the plans of those now in control of the Companies it is obvious that one very important reason for transferring the plant to the new Company is that it may be represented by a capital stock more nearly equivalent at par to its value. It is equally obvious that this purpose cannot be accomplished if the ownership of the plant is retained by the old Company without the declaration of a stock dividend, in direct violation of the statutory prohibition. As an issue, merely for account of the old plant, of an increased amount of stock by the new Company is to pass directly into the hands of the same persons, precisely the same result will be secured so far as relates to them or the public. For these reasons the Board cannot in any event see its way clear to approve, for account of the purchase of the old plant, prior to the recent expenditures thereon, any stock in excess of a par value of $75,000.

Section 24 of Chapter 109 of the Revised Laws provides that "a gas or electric light company shall issue only such amount of stock or bonds as the Board may from time to time vote is reasonably necessary for the purpose for which such issue of stock or bonds has been authorized. Such decision shall be in writing, shall assign the reasons therefor, shall, if authorizing such issue, specify the respective amounts of stock or bonds which are authorized to be issued for the respective purposes to which the proceeds thereof are to be applied."

Under these provisions there may be fair ground for questioning the right of the Board to refuse to approve stock merely because it does not agree with the Company as to the wisdom or expediency of certain expenditures which are yet within its corporate power, or even because in its judgment another company is already adequately and fairly serving a community, and a new plant may be an unnecessary duplication of capital. On the other hand, it is within the power, and doubtless is the duty, of the Board to refuse its approval of stock whose proceeds are to be devoted to an illegal purpose.

The request of the Company is that the proceeds of a portion of the proposed stock issued be applied to the purchase of all the property of the existing Gas Light Company. The municipal Council insists that the Gas Light Company has no authority to sell its property, and that such a sale is prohibited both at common law and by Section 13 of Chapter 121 of the Revised Laws. It may be conceded that if the old Company were in actual process of liquidation, in bankruptcy or receivership proceedings, or under a decree of court for its dissolution, a new Company might purchase its assets and be allowed to issue capital stock for such sum as might be reasonably necessary for the purpose, but in this case the old Company has not encountered any of these vicissitudes of fortune. It is solvent, and no proceedings have been undertaken for its dissolution. It is actually engaged in the manufacture and sale of gas, and no conveyance of its property to the new Company has yet been made. If the contention of counsel for the city is correct, such conveyance will be void because it is contrary to the statute prohibiting a gas company from transferring its franchise, and because of the established common law principle that a public service corporation cannot so dispose of its property as to take away its power to perform its public duties. The determination of this Board can neither make such conveyance valid nor invalid. That questiou is for the courts; it is not necessary that the Board should attempt to determine it. It is the opinion of the Board, however, that the question raised and the transaction to which it relates are of such importance, and that the legality of such a conveyance by the old Company to the new is open to so serious doubt, that the Board ought not to approve an issue of stock for the purpose until either the conveyance has been actually made or its legality has been determined by some judicial tribunal.

The Decision of the Massachusetts Board of Gas and Electric Light Commissioners in the Matter of the Plymouth Electric Petition.

This is a complaint in writing under Section 34 of Chapter 121 of the Revised Laws, by the Selectmen of the town of Plymouth, of the quality and price of electricity supplied in said Plymouth by the Plymouth Electric Light Company.

After due notice a public hearing thereon, as required by law, was held in Plymouth, at which the petitioners and Company were represented by counsel. The complaint, so far as it concerns quality and the price for commercial lighting and power, was waived by the Selectmen at the hearing, which was confined to the question of the price of street lights only.

Prior to August, 1907, the Company was supplying for street lighting about 330 incandescent carbon filament lamps and 8 nominal 1,200-candle power arcs. Three of the incandescents were 32-candle power and the others 25-candle power, and all burned upon a midnight, moonlight schedule. Of the arc lamps, one burned all night, the others upon the same schedule as the incandescents. In that month the Company of its own accord, but with the approval of the Selectmen, began the gradual replacement of these incandescent lamps with 40-candle power, tungsten filament lamps. The displacement of the carbon filament lamp was gradual over the system, and no definite record has been preserved of the number of lamps of each kind in use at any particular date. In the later portion of this period of change the arc lamps were replaced by clusters of 5 incandescents,

and a limited number of 200-candle power tungsten incandescent lamps was installed. All the arc and carbon filament lamps have thus been replaced by tungsten incandescents.

Before and since the above changes in the lamps the Company charged and the town has paid $21 a year for the 32-candle, $20 for the 25-candle incandescent and $125 a year for the all-night arc, and $85 a year each for those burning until midnight.

Prior to the annual town meeting in 1909 the Company offered, provided a 5-year contract were made, to supply upon moon schedule the incandescent lights until midnight at $18 a year, and all night at $21 a year, with a uniform price of $105 per year for the arcs, all the incandescents to be 40-candle power tungstens. The Selectmen recommended that the all-night proposition be accepted, and that all the arcs be replaced by incandescents, either singly or in clusters of 5 for each arc lamp. No action, however, was taken by the town beyond referring the question of street lighting to a committee consisting of the Selectmen and 5 other citizens, to report at a future meeting. At the annual town meeting in 1910 the Selectmen were authorized to make a contract, for a term not longer than 5 years, for lighting the streets, on such terms and conditions as they may think proper, but were also instructed to enter a complaint with the Board of Gas and Electric Light Commissioners as to the quality and price of electricity furnished by the Company.

All the arc lamps having been displaced by clusters of 5 each, as already described, the lamps in actual use appear to be 336 40-candle power, 50-watt tungstens, three 250-watt tungstens and 8 clusters of 5 40-candle power lamps each. All these burn upon a moonlight schedule until midnight, except 7 of the clusters, which burn all night. The lamps, however, are billed to the town in the same way as in August, 1907; that is to say, bills are made for 336 25-candle power lamps at $20, three 32-candle power at $21, 7 arcs at $125 and 1 arc at $85 per year.

In August, 1907, the price for commercial lighting was 20 cents a kilowatt hour, with discounts from 5 per cent. upwards, according to the size of the bill. Prior to the petition in this case these prices had been reduced to a maximum rate of 18 cents with a sliding scale to 10 cents, according to the amount used monthly, and a discount of 10 to 20 per cent., according to the number of nights burned per week.

Under the scale of prices for commercial lighting the Company received, during the fiscal year ending June 30, 1910, for all electricity sold for this purpose, an average of but little more than 8 cents a kilowatt hour. As the complaint relative to the commercial business was distinctly waived, these prices are mentioned only to aid in understanding the position and claim of the Selectmen hereinafter stated, and it is not the purpose of the Board to indorse the Company's present schedule of prices for light and power or to express any opinion with respect to it.

It was contended, in support of the complaint, that the price charged for the incandescent lamps, taking into account prices charged in other towns of the Commonwealth, is too high; that, irrespective of prices elsewhere for 25-candle power carbon filament lamps, the price for tungsten lamps now in use should be less, because the latter, though of higher candle power, consume less current than the former; and that, compared with the prices charged by the Company to its other customers, the price for street lights is too high. In connection with the last proposition it was contended that the price for street lights should be based on the theoretical consumption of current by the lamp, either at the average rate charged for commercial lighting or at the average of all lighting, commercial and public, or upon the same schedule as commercial lighting, all the street lamps being regarded as the installation of a single commercial customer with an annual bill. On the other hand, the Company contended that the candle power is the true measure of the value to the town of the street lights, and a proper basis for the price. Neither party relied on any attempt to separate the Company's investment and operating costs for the street lights, and to base the price upon these with a fair return upon such portion of its investment.

While evidence of prices charged in other communities for street lights is not without weight, it can seldom if ever be regarded as controlling. Its force is also greatly weakened by the fact that such comparisons must usually be made with prices charged for carbon filament lamps, or originally made for such lamps and continued even where, as is now so common, tungsten lamps have been substituted; and by the further fact that, until very recently, in fixing prices for street lights no consistent, rational theory has been followed, either by the companies or by the public authorities, save a purpose on both sides to make the best trade possible. Whatever force may have formerly attached to the candle power as an arbiter of rates, it must under present business methods and the development of the art be supplanted by a consideration of the energy supplied.

It must be conceded that, based upon cost alone, the street lamps of the tungsten type and of the same or even of a somewhat higher candle power can be supplied at a less price than the carbon filament lamps, until recently exclusively used, because of their lower cost to maintain and operate; but it is by no means clear that such reduction in cost is proportional to the difference in the amount of energy consumed in the lamp. Neither those investment, distribution and management costs which necessarily enter into and constitute a substantial share of the total, nor, for that matter, certain of the costs of producing the electricity, seem to be in any degree reduced by the substitution of tungsten for carbon filament lamps. Coal, and possibly repairs and maintenance with some minor supplies at the station, appear to be the only items of street lighting cost of which it may be safely claimed that they vary according to the quantities of energy made and used. The actual saving to the Company in these items, due to the less amount of energy required for the tungsten as compared with the carbon street lamps in Plymouth, based upon the figures of the fiscal year ending June 30, 1910, appears to be somewhat less than $1 a year for each lamp, although the reduction in energy used in the lamp is more than 40 per cent. Indeed, the tendency of the introduction of tungsten lamps, for both commercial and street lighting purposes, is to increase the cost per unit, because of a reduction in the total units sold without any reduction in costs outside the generating station—a tendency which obviously can be checked and overcome to a large extent on the other hand by the general development of the business and by other factors of importance. However, unless the prices charged or offered for carbon filament lamps are assumed to be reasonable, the inquiry as to the amount of reduction justified by the substitution of tungstens offers no real solution to the problem as to what price the town should in fairness pay.

The proposition that the price of street lights should be based strictly upon the amount of energy required to operate the lamps, and should be made upon the same or as advantageous terms as are offered to private consumers, is more fundamental.

Just why any more weight should be given to the suggestion of an average price received rather than any other price in the Company's varied schedule was not fully explained. The average price, which is determined by dividing the total receipts from all customers by the total kilowatt hours sold, is not, unless by chance merely, the price offered to any customer. It may be that no customer ever pays exactly that price, and it is difficult to see why, if the street lights are to be governed by the commercial schedule, that price rather than some other of the numerous prices which it contains should be adopted. That it is a very attractive proposition to the town is evident, because it would result in an exceptionally low price for the street lights, the average price received by the Plymouth Company for commercial lighting being lower than in most Companies of its size in the State. It is important also, as a general proposition, because if applicable in Plymouth it is difficult to see why it might no be applicable to all other Companies.

The Board is unable to agree with the contention that the curren used in all of the lamps should be combined and treated as the energy supplied to a single consumer; in other words, that all the lamps should be taken together and considered as a single installation of a large consumer. It is quite true that the billing and collection costs are minimized under the conditions of street lighting supply and become those of a single customer, but the numerous and widely scattered installations, and the investment and maintenance charges incident thereto, which constitute by far the more important items of cost, give to each lamp or group of lamps many of the characteristics of an individual customer of small size, if the commercial scale of charging is to be applied.

If the rule were to be generally adopted of charging for these lights merely in proportion to the current used, the price for a lamp of relatively low candle power and high wattage, like the carbon filament lamps in common use until recently in Plymouth, would be very much greater than for the relatively higher candle power and low wattage tungsten lamps, although the latter are clearly of greater value to the public. It is equally clear that this method of charging would make the price for all-night lighting approximately double that for midnight lighting, a principle which no company has yet attempted to impose, and one which municipalities, it is safe to say,

would be absolutely unwilling to adopt. Prosperous and well-managed companies have found all-night lighting profitable upon a wholly different basis, and municipalities have long been accustomed to pay proportionately less for all-night than for midnight lighting.

While these suggestions illustrate the difficulty of adopting, without qualification, the rule proposed by the town, yet the proposition that the basis of the charge for incandescent street lighting should be the commercial rate is an important one and entitled to great weight. With equal emphasis in other cases it has been urged that in fixing street lighting prices the Board should determine the fixed and variable costs for such service, and completely separate these costs from those of every other portion of the business. Strong reasons are found in support of both propositions. The Board in this case has found it neither necessary nor practicable to rely implicitly upon either, although giving to both, in connection with the other circumstances, due weight in the solution of the problem in hand. The Board is nevertheless convinced that companies should more fully recognize the reasonableness of the claim by municipalities to have their street lamps supplied upon as advantageous terms, all things considered, as are offered to private customers, and believes that the same theories of commercial expediency which have been so persistently applied in making commercial lighting and power rates may, with no less fairness, be applied to the street lighting schedule. Street lighting may fairly be required to bear its reasonable proportion of all necessary costs, sharing such losses as may be unavoidably incident to the business as a whole, but its fair price is not necessarily determined upon the commercial rates, especially if these for any cause happen to be unreasonably low or high, nor upon special claims distinct from those of the entire volume of the business. The methods of determining public and private lighting prices in any case must be directed to a single end; namely, to determine what is a fair price, taking into consideration all the facts and circumstances involved in the case. But prices no more than dividends are governed by arbitrary or inflexible rule, nor are they wholly exempt from those business conditions and necessities which are dormant in every company. It is from this standpoint, recognizing the force of the town's contention, but as a conclusion from all the facts developed at the hearing, and in the subsequent examination of the Company's affairs that the Board has reached its recommendations.

With a view to a fuller understanding of the Board's position some reference may be made to the Company's financial ability and condition. This Company was originally organized under the laws of New Hampshire, in 1886, and was reorganized under the laws of this State in 1888. It has experienced, in an unusual degree, the vicissitudes incident to the progress of the art since it began the supply of electricity. Prior to the filing of this complaint the Company had paid to its shareholders since organization only two dividends, amounting in all to 3 per cent. While it has apparently endeavored to maintain its prices in correspondence with other Companies of similar size, it has never been able to recover out of income an amount sufficient to meet the depreciation and necessary cost of reconstruction of its plant. Its generating plant has, however, been recently very largely reconstructed, with efficient apparatus of the present-day type. For these reasons, and in this way, the Company has acquired a substantial burden of debt which, so far as it represents depreciation cost, must be extinguished, if at all, out of income and not out of new capital. Such financial condition, while it imposes upon the Company a conservative course as to dividends, and in no respects lessens the regard it should have for the interests of the public in fixing its rates, may also fairly justify it in an endeavor to eliminate, in a reasonable time, that part of its indebtedness which represents the depreciation of the plant, for which provision has not been made hitherto. When this is accomplished further reductions in both public and private lighting prices may be confidently expected. The earnings of the Company, under all the circumstances, do not appear to be excessive, nor its financial policy, up to the time of the hearing, open to particular criticism.

Following the principles suggested the Board considers the prices named in the following recommendations to be reasonable and fair for lamps of the type and candle power now installed. The Board recommends:

That on and after the first day of August, 1911, the price for street lights supplied by the Plymouth Electric Light Company for moonlight lighting, substantially as heretofore, shall not exceed the prices named in the following schedule, to wit:

For 50-watt, 40-candle power tungsten lamps, burning until midnight, not more than $16 each per year.

For 50-watt, 40-candle power tungsten lamps, burning all night, not more than $20 each per year.

For 250-watt, 200-candle power tungsten lamps, or their equivalent in clusters of five 50-watt, 40-candle power lamps, each burning until midnight, not more than $71 per year.

For 250-watt, 200-candle power tungsten lamps, or their equivalent in clusters of five 50-watt, 40-candle power lamps, each burning all night, not more than $89 per year.

Items of Interest
FROM VARIOUS LOCALITIES.

A CORRESPONDENT in Salt Lake City (Utah) writin g under date of August 24th, incloses this: "There is to be keen competition between the Utah Gas and Coke Company and the Utah Light and Railway Company for the privilege of improving the street lighting system in vogue in Salt Lake City, as contemplated by the Commercial Club. At a luncheon there some days ago, which was attended by members of the special Club Committee appointed to take up the matter of better street lighting, C. B. Babcock, representing the General Gas Light Company, Kalamazoo, Mich., and representatives of the local Gas Company, presented a proposition to use gas in the contemplated improvement. The latest kind of street lighting gas lamps have been ordered by the local Company, and will be installed on Exchange place in front of the Commercial Club for exhibition purposes. The Utah Light and Railway Company is already preparing an exhibit of model street lighting on West Temple street near its headquarters, and a lively competition is expected. Members of the special committee expressed themselves in favor of competition and promised to take up the Gas Company's proposal at the next committee meeting."

THE Mansfield (O.) Gas Light Company, through Secretary W. C. Hedges, informs us that on August 24th last, natural gas was turned into its mains, replacing the manufactured article which had been successfully sent out to customers for well over 50 years. Well, be it one type of gas or another, we hope that the Hedges syndicate will always be successful.

MR. J. FRANK DOSTAL, formerly of the electrical division of the Denver (Col.) Gas and Electric Light Company, has been appointed General Manager of the Colorado Springs (Col.) Electric Company. Mr. George B. Tripp who has been General Manager at the Springs since 1902, has removed to Harrisburg, Pa., where he has affiliated with the Bullock interests.

RECENT advices from Louisville, Ky., are to the effect that the bond house of N. W. Harris & Co., of Chicago, on the 25th prox., submitted an offer to the Directors of the Louisville Gas Company to purchase as many shares in the Louisville Gas Company as could be obtained at the usual price of $120 per share. The offer provided, though, that at least 75 per cent. of the stock should be ready for delivery. It is also reported that the Harris combination has an option on the Kentucky Heating Company's shares.

DEPUTY DISTRICT ATTORNEY A. W. LANE recently filed with the Federal Court a story of complaint against the Gage County (Neb.) Gas, Light and Power Company, praying that the corporation be fined $10,000 for having failed to make its report within the time required under the law. The minimum fine being $1,000, the matter for speculation is what caused Mr. Lane to ask for the maximum punishment.

MR. MILTON A. CARTER, Superintendent of the Weymouth (Mass.) Electric Light and Power Company, since 1891, has accepted the post of Superintendent to the Old Colony Gas Company.

THE concern of H. M. Byllesby & Co., through its Chicago office, announces a quarterly dividend of 1¾ per cent. on the common stock of the San Diego (Cal.) Consolidated Gas and Electric Company. It is payable the 15th inst. That is going along pretty smoothly; but 'tis a well-managed concern.

THE Board of Public Utilities, of New Jersey, has surely been carrying on this summer a series of probes into the business of the gas

companies of that State, and although certain changes—notably in the instance of the Consolidated Gas Company, of Long Branch—in respect of concessions in gas selling rates have been recommended, the inquiries nevertheless have developed many instances in which the business course of the companies is worthy of decidedly positive commendation. One of these instances is nicely brought out in the hearing regarding the methods of the Freehold (N. J.) Company. There it was shown thas the Company's practice had been, for several years, to return to its shareholders the annual sum of 6 per cent. on their investment. When the profits exceeded that sum, or an amount sufficient to enable the ordering of a concession of 10 cents per 1,000 in the selling rate, such concession was ordered forthwith.

MR. CHARLES M. PUGH, for several years connected with the executive offices of the Des Moines (Ia.) Gas Company, and more recently in charge of its Clarinda district, died in that settlement the morning of August 17th. He was in his 47th year.

THE Ohio Tax Commission has been acting in a very arbitrary manner of late over its assessing gas properties in that State, and the main cause for complaint, too, concerns the smaller corporations. For instance, witness these cases: The Paulding Artificial Gas Light and Fuel Company, valuation for 1910, $1,185; for 1911, $10,000; Wilmington Gas, Light and Coke Company, 1910, $4,000; 1911, $40,000.

B. T. BRADY, writing from Hamilton, O., under date of August 25th, says: "This week, and it was really a test case, Squire Charles S. Hawes, sitting in lower court, mulcted the Hamilton Gas and Electric Company in a fine of $75 for infracting the ordinance regulation declaring that no rent shall be charged for the use of gas meters. The penalty was put in force at the instance of Attorney F. J. Primmer, who brought to the attention of the court, receipts for payment of gas account by one J. H. Davis, the statements over which included charges for meter rent each month. The Company did not contest the penalty, preferring to appeal from the judgment to the Court of Common Pleas, before which tribunal a trial on the merits would be heard."

A VERY much involved case is reported from Kenton, O., the inception of which is a suit filed by the Kerlins, of Toledo, O., against the former stockholders of the Kenton Gas and Electric Company, the properties of which were acquired not long ago by the operators of the Hardin-Wyandot Lighting Company. The Kerlins ask for the sum named out of the sum paid for the plant, which they allege was $153,000, asserting that in 1905 they entered into a contract to purchase the Kenton properties for $100,000, giving three notes to cover the sum, the earnings of the Company to be credited on the purchase price. Plaintiffs declare that $19,000 on the agreement had been paid, and, at the time of the sale, trustees were named to hold the stock. The petition further avers, because the trustees did not apply the profits to said purchase price, payments were discontinued, with the further averment that the Kerlins are ready to pay the remainder of the sum that they contracted to pay.

THE Massachusetts Board of Gas and Electric Light Commissioners has authorized the Plymouth Gas Company to issue 2,880 shares of stock at par; also, $192,000 in 20-year bonds.

NOW that the works' section of the betterments on the plant of the Plymouth (Mass.) Gas Light Company has virtually been completed, Manager Tudbury is arranging for the construction of a brick office building on the site formerly covered by the stable and sheds.

THE Williamsport (Pa.) Gas Company has agreed to extend its mains to and through the streets of the outlying settlement of Duboistown.

MR. JOHN CUSHMAN, of Haverhill, Mass., has been awarded the contract for laying the connecting main from the Rochester (N. H.) Gas Company's distributing system to the village of Somersworth, N. H.

CONTRACTS for the furnishing of silica retorts and settings, to be installed in the respective gas plants at Lockport and Elmira, N. Y., and Terre Haute, Ind., have been awarded to the Gas Machinery Company, of Cleveland, O.

THROUGH the attention of Mr. Sloan, we are informed that our informant and Mr. W. J. Huddle have organized the advisory and consulting firm of Sloan, Huddle & Co. Their headquarters are to be in the Carroll Block, Madison, Wis., from which place they are ready to receive inquiries regarding appraisals, bond issues, engineering examinations, insurance, industrial purposes, rate making, reorganizations, statistical investigations, and the like. The firm should be a go from the outset, in that Mr. Sloan is a practical engineer, of demonstrated ability, while Mr. Huddle has keen knowledge respecting management and finance.

MR. HAROLD F. KEYES, who has been in the service of the Northampton (Mass.) Gas Company for a number of years, has been appointed business agent for the Leominster (Mass.) Gas and Electric Company. Mr. Keyes is to be congratulated over his promotion; and there can be no doubt whatever that he will manage the duties of his new position with zeal and success.

THE special committee of the City Council, of Springfield, Mass., appointed to investigate the subject of the municipal direction of gas and electric lighting plants, have visited several cities of Massachusetts, and have also interviewed the Massachusetts Board of Gas and Electric Light Commissioners on the matters. The members of the Committee are: J. D. Hadfield (Chairman), F. E. Carlisle, A. W. Fulton, Jno. A. Bond and P. H. McMahon.

LAST Monday was the day set for the hearing (rather the opening of the hearing, for undoubtedly the "examination" will drag along for many a day) of the application of the authorities of Cleveland, O., for an order restraining the East Ohio Gas Company from distributing through its Cleveland mains a gas composed of both artificial and natural sorts. As we have not heard anything further respecting the matter (up to Friday last) it is fair to presume that further delay in preparing the case has been experienced.

A RECENT issue of the Baltimore (Md.) *Sun* accompanies a special section devoted to a recounting of the building boom now on in that city for 5 years or more, with a large picturing of the new Industrial Building, an illustrated description of which appeared in the JOURNAL for last week.

A NOVEL plea was recently made for the extension of gas mains by a woman resident on Philips avenue, south of Wyoming street, Dayton, O. The mains of the Dayton Company are quite some distance from the Philips' roadway, and the number of dwellers along the stretch between the Company's existing mains and the point to which these would have to be extended, is insufficient to reach the Company's requirement in respect of consumption per mile. Knowing this, Mrs. Peters was sufficiently resourceful to appeal to a Public Service Director after this fashion. She said she knew that the number of dwellers was probably under those required, but averred that if the city would order the placing of a number of gas lamp posts along the indicated line, the consumption therethrough would be adequate to cause the Company to put down the pipe.

THE gas rate for South Amboy, as per order recently issued by the Public Service Gas Company, of New Jersey, will hereafter be $1 per 1,000. The application of the rate is retroactive, from August 1st.

THE members of the Building Committee, Wilmington (Del.) City Councils, have recommended that the bid of the Wilmington Gas Company, for the lighting of all the public buildings in that city, be accepted. The contract is to run for 3 years.

THE Public Service Commission of Maryland has signed an order permitting the Frederick Railway Company to purchase the minority stock holdings in the Frederick Gas and Electric Company.

A POSTAL card from Ben. F. Bullock, General Superintendent of the Fredericksburg (Va.) Gas Company, is at hand. The card is of the regular type for mailing, and carries a colored photograph of the Fredericksburg depot of the R. F. & P. Railway. The scene is a night one, and the front of the structure, the complete length of the plat form, is brilliantly illuminated by means of gas. Mr. B.'s message on the card explains the situations with all due definiteness. The words were these: Dear JOURNAL—"Gas still in the lead! Lighted by multiflex!"

The Market for Gas Securities.

The week was wet, also dark; consequently the output of gas was tremendous. In fact, the record was made in New York on gas consumption (summer account) for August. The reflection of all this, however, in the stock market was a gain in the bid price for its shares of ¼ point or so! What do you think of that response? The opening quotation to-day (Friday) is 134 to 134½.

Brooklyn Union, by-the-way, is off ¼ in the bid for the week. It came in at 133 to 140. Laclede is 103½, ex-div. Peoples, of Chicago, is 103½ to 104¾. The inquiry for bonds continues quite brisk.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

SEPTEMBER 4.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	134	134¼
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	115	118
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	50	70
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	100	133	140
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	180	—
Out-of-Town Companies.				
Bay State	50,000,000	50	⅝	¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	50	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,460,084	100	106½	—
Mortgages, 5's	3,400,000	—	89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co.	6,580,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	78	83
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	88	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	103½	103½x
Preferred	3,500,000	100	91½	102
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	108¾
Massachusetts Gas Companies, of Boston	25,000,000	100	92¾	93
Preferred	25,000,000	100	97½	97¾
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	103	103¼
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	100	102
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	106
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	97	98
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,800,000	200	443½	443½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	381	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 18, 19, 20, 21, 1911. St. Louis, Mo. Officers: President, Donald McDonald, Louisville, Ky. Secretary, A. B. Beadle, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, ———— Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1911. New York City. Officers: President, M. J. Brayton, Utica, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Gulld of Gas Managers of New England.—Annual meeting, March, 1912. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, time, March, 1912, Chicago, Ills. Officers: President, C. B. Strohn, Elgin, Ills.; Secretary-Treasurer, F. E. Newberry, Dixon, Ills.

Illuminating Engineering Society.—Annual meeting, Sept. 25, 26, 27, 1911, Chicago, Ills. Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York, Secretary, Albert J. Marshall, 36 West 39th street. New England, Secretary, W. S. Farrow, 1290 Massachusetts avenue, Cambridge, Mass. Philadelphia, Secretary, S. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, F. H. Bernhard, Marquette Building.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, May, ——, 1912; Clinton, Ia. Officers: President, G. W. Clabaugh, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association.—Annual meeting, time, Sept. 20, 21, 22, 1911; Detroit, Mich. Officers: President, A. P. Ewing, Detroit, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1912; St. Louis, Mo. Officers: President, F. E. Murray, Louisiana, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, October 23-28, 1911. Denver, Officers: President, C. N. Stannard, Denver; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May, 1912, Kansas City, Mo.; Officers: President, A. B. Macbeth, Independence, Kas, Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1912; Boston. Officers: President, J. A. Coffin, Gloucester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn, Belmar, N. J.

Ohio Gas Association.—Annual meeting, February 6 and 7, 1912, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary-Treasurer, T. C. Jones, Delaware, O.

Pacific Coast Gas Association.—Annual meeting, Sept. 19, 20, 21 and 22, 1911, Oakland, Cal. Officers: President, F. A. Leach, Jr., Oakland, Cal.; Vice P esident, W. Baurhyte, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1912, Williamsport, Pa. Officers, President, C. W. Butterworth, Millon, Pa; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 254 West 39th street, New York city.

Southern Gas Association.—Annual meeting, April, 1912, Jacksonville, Fla. Officers, President, H. B. Hoyt, Jacksonville, Fla.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting, April 27, 28, 29, 1912; Houston, Tex. Officers: President, J. E. Carroll, Beaumont, Tex.; Secretary, D. G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 15 and 16, 1912, Milwaukee, Wis. Officers: President, H. M. Buck, Waukesha, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.